

The Mining Journal

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The Pause That Refreshes

THE world-wide shortage of technologists (qualitative even more than quantitative) in practically every industry is nowadays such a commonplace as to make it difficult to write of the problem in the context of any particular industry without reflecting that the situation is doubtless just as bad in a number of others. However, the crisis in supply which is in prospect for the metalliferous mining industry is such as to sweep aside such inhibitions.

As far ahead as anyone in mining can see, the demands upon the productive capacity of this most basic of all industries seem certain to grow and, moreover, to grow at an accelerating tempo. This is not simply a consequence of expanding population trends. Both the social and economic aspirations of the under-privileged, and the financial pump-priming techniques, which have become part of the equipment of modern government, seem likely to ward off any major recession and to ensure that the industrial machine will go on turning faster and faster if only because government—no matter how democratic or how totalitarian—dare not apply the brake.

Already we have, during and since World War II, repeatedly experienced periods of grave shortage in the supply of metal, and although we now find ourselves temporarily in an easier statistical position, there seems no reason to suppose that in the long term the metal supply position will not become increasingly difficult. Certainly the Paley Report pointed clearly in this direction, and in the years which have elapsed since then, nothing has occurred to suggest that its assumptions regarding growth of consumer demand were anything but conservative.

The causes of this condition of scarcity are, of course, manifold but for the most part they can be expressed in terms of manpower shortage. Basically this is not just a matter of a shortage of "hands" although the immediate deficiency often expresses itself in this form. The real shortage is in highly qualified personnel — geologists, mining engineers, and extraction metallurgists—who have been trained to think creatively either in an executive, consultative or research capacity.

In recent months we have had occasion to publish a notable series of articles on mine management in South Africa by Professor Black of Wits University. From this the need for better equipped senior personnel rather than just for more personnel emerged as the most important single requirement. This thesis was again taken up the other day in a speech by the retiring president of the Association of Mine Managers of South Africa, which brings out clearly the dilemma of an industry which must spread its ablest men so thinly that the choice has constantly to be made between mortgaging the future to get more production now, and foregoing present expansion in the interests of research which will eventually enable expansion to go ahead at a greater rate and with lower manpower requirements.

Nor is evidence lacking that the mining companies themselves are alive to the dangers ahead, and the excellent booklet for schools ("Careers in Metal Mining Industries") published at the

end of last year by the British Overseas Mining Association is evidence enough of the industry's recognition that no improvement in this situation can be expected without an adequate intake at school-leaving age.

One significant and somewhat alarming factor in the situation is the wastage of trained mining engineers into other industries. There are, of course, a variety of reasons for this, but there is little doubt that a good deal of the trouble is due to insufficient care being taken with the training and development of new graduates during their early years on the mine. In part, this is due to a failure by some managements to plan the graduate's first few jobs on the mine, so as to enable him to get the maximum experience and to keep the period of employment in dead-end jobs down to a minimum; and in part also it is due to a failure to acquaint the junior graduate with the precise programme of executive development open to him. (In passing it may be pointed out that it was this particular shortcoming in British coal mines which led to the introduction of the Ladder Plan a few years ago.)

One of the principal factors in sustaining interest among young graduates in the early years could be the knowledge that those, who have done sufficiently well, will have the opportunity for post-graduate university study at the time when they will be most likely to benefit from it, namely, after they have been at work long enough to have gained thorough practical experience of the industry yet while they are still young enough and flexible enough to profit from further study. This lesson has, of course, already been well learned by the National Coal Board, which now offers its bright young men facilities for a wide variety of post-graduate courses, and has also established its own staff college somewhat on the lines of the Staff College for Industry at Henley.

Hitherto, no such comparable facilities have existed at British universities for graduates who have entered the British overseas mining industry. For this reason, the recently announced plan for the establishment at the Royal School of Mines of a post-graduate course in mining is to be warmly welcomed—not so much because the establishment of this course promises of itself to provide a complete solution to the problem (an eventual annual intake of no more than twelve post-graduate students is visualized), but rather because it represents a first important step. Once this first excursion into advanced professional training in the industry has become a proved success, other schemes will surely follow.

The R.S.M. course is planned to run for one academic year—October/June—the first commencing next autumn. At present the syllabus is admittedly somewhat experimental and will as far as possible be tailor-made to the requirements of the individual student. The primary purpose of the course is, however, stated to be the preparation of mining engineers to assume executive responsibility. Training will be provided in the new techniques being developed in mining technology, and some attempt will be made to acquaint the student with developments in parallel and ancillary technologies likely to have a bearing on his own work. Of equal, if not greater importance are the opportunities to be provided by the course for the study of a wide range of mining management problems.

Past generations of mining engineers have perforce had to achieve positions of executive responsibility without recourse to facilities such as those now planned by the R.S.M., and many of them no doubt feel that they are none the worse for it. However, these will in many cases be the "best types" who could have been relied on to have reached positions of responsibility in the industry by any route. Yet for every brilliant graduate there have always been perhaps another six who could have greatly

improved their subsequent record by more encouragement, more imaginative handling and, above all, by more time to think and to review their experience in the light of developing techniques in the industry. There have also been perhaps another three who have failed altogether, yet who might well have been retained in the useful service of the industry had more thought been given to their personal development.

The truth is that whilst formal advanced training is obviously not an essential pre-requisite for the evolution of every successful mine manager, it is possible greatly to accelerate the usual processes of learning by trial and error through the careful planning of formal instruction. It isn't really necessary to make all the mistakes oneself in order to learn to avoid them. Given correct training technique, it is possible to profit from other people's experience, and this, expressed in its simplest form, is essentially what the R.S.M. post-graduate course sets out to do.

The success of this most commendable initiative must depend to a great extent on the reception it gets among mining companies. It is, of course, true that in these days of over-full employment any young man, who can save enough to keep himself during a year's advanced study, can leave his company, with or without their blessing, in the sure knowledge that at the end of the year a job will be waiting for him somewhere. However, not only may many junior officials be unaware of the facilities being offered (the R.S.M. course is in no way restricted to old R.S.M. students), but no one, least of all the R.S.M. itself, would want this kind of disruption to occur.

The ideal solution would seem to be for the companies, either individually or through some such agency as B.O.M.A., to provide bursaries for selected members of their staff, on the understanding that those who took advantage of the scheme would in honour bound be committed to return to the service of the same company for a reasonable period thereafter. We can think of no more necessary long-term investment for the industry to make than this.

CANADIANS REVIVE EIRE'S MINING INDUSTRY

The first shipments of copper ore from Ireland in more than fifty years will start going out from Saint Patrick's Copper Mines Ltd., Avoca, County Wicklow, this autumn. The timetable set by the company is being fully maintained and expectations are that about 4,000 tons of ore, containing 1.12 per cent copper, will be mined and dressed each day from the autumn onwards.

It will be recalled that Saint Patrick's Copper gave a "substantial contribution" towards a harbour development scheme for Arklow, the port through which the company expected to export copper ore. Initially, the copper ore will be exported to Britain and the Continent for processing. Later, if the company's smelter is built, the ore traffic would be inwards through Arklow.

Some eighteen months ago the first representations by the parent company, the Mogul Mining Corporation of Toronto, were made to the Eire government regarding the copper findings of the State-supported Minerals Company Ltd., which had claimed to have blocked out more than 13,500,000 tons of copper ore in the Avoca district. Prospecting work thus far had cost the State more than £500,000. Test drillings subsequently undertaken by the Mogul Mining Corporation's subsidiary have shown that the ore bed on the 7,000-acre Avoca site was, in fact, likely to amount to between 30,000,000 and 40,000,000 tons.

Development work is proceeding steadily at the mines and "highway tunnelling" is going on at the rate of 100 ft. in length and 12 ft. in depth each week. A flotation mill close by the tunnel entrance is now under construction and will be ready by late August. It is estimated that about 40 tons of pure copper ore will be turned out from this mill each day and sent forward for smelting.

Meanwhile, a modern mill for ore dressing is to be set up at the Wicklow Mining Company's lead and zinc mines at Glendalough, County Wicklow. These mines were recently taken over by a Canadian concern. Four other mineral deposits in the Wicklow area are also being examined by the prospecting team.

The Mining Corporation of Ireland has announced that a second vein of gold has been found in a lead and zinc working about one mile from Clontibret, County Monaghan, where the company is carrying out development of old mines. An official of the company, a subsidiary of the Can-Erin Mines Ltd., of Toronto said it was hoped that actual mining of the Clontibret deposits would start by the end of the present year or early in 1958.

It is reported from Dublin that "very large" American interests may soon be appearing in the Allihies area of County Cork, where at present the Emerald Isle Mining Co. Ltd., a subsidiary of Can-Erin, is developing old copper mines. Emerald Isle has now set up a complete mining plant in Allihies.

Two Canadian concerns have already been granted prospecting facilities in this area, and last month the Eire Minister for Industry and Commerce compulsorily acquired all minerals under certain lands there. The Ministerial Order referred not only to lands being developed by the Emerald Isle Mining Co., but also to other tracts where mineral deposits are believed to exist.

Technicians of a Canadian mining company whose subsidiary, Priority Mining Co. Ltd., of Dublin, is at present undertaking preliminary surveys of mineral deposits in County Donegal, have visited the old lead and silver mines at Keeldrum, near Gortahork, County Donegal. They spent several days on the site and removed a large number of samples for analysis. An official of the company said that following the preliminary tests, his company considered the possibility of reopening the mines was highly favourable.

AUSTRALIA'S URANIUM DEVELOPMENT

A statement by the Australian Minister for National Development, Senator Spooner, places the capital invested in the Australian uranium mining industry at £A30,000,000. When the Mary Kathleen uranium operations reach the productive stage, the country's uranium output will reach 1,000 tons of uranium oxide per year. Comparative production figures will be: United States, 7,000 tons; Canada, 4,000 tons; South Africa, 4,500 tons; and Belgian Congo, less than 1,000 tons. Expenditure at the Mary Kathleen project has reached a total of £A4,500,000, to the end of 1956. Major items of expenditure are plant, machinery, buildings, roads, airstrip, housing in the new township, and dam construction. This latter has a capacity of 3,300,000 gal., and is situated on the Corella River, eight miles from the mine and town. In addition, diamond drilling is to be resumed to explore for additional ore reserves. A contract has been arranged with the U.K. Atomic Energy Authority for the supply of concentrates to the value of £40,000,000. It is expected that production

will be commenced in January, 1959. Stockpiling of ore has been in progress for several months.

The uranium boom has established this one centre in Queensland, but New South Wales, Western Australia, Victoria and Tasmania have disclosed nothing of commercial value.

The Northern Territory, however, contains areas of promise. The Rum Jungle mine has become an important producer and is also treating ore from other operators. There have been discussions from time to time on the economics of establishing another treatment plant in the Territory, but it would seem that the collective reserves of the developing companies do not warrant the expense involved.

In South Australia, the State-owned Radium Hill mine is in regular production, despatching concentrate to the chemical treatment plant at Port Pirie. The South Australian government has prospected other uranium occurrences north of Radium Hill, at Crocker's Well and Mount Victoria Hut, but for some time has been trying to interest private enterprise in the development and working of the occurrences. So far, finality has not been reached in these negotiations. These northern deposits are regarded either as workable as high-grade, selective mining propositions, or as large low-grade open cut undertakings.

The Minister stated that Mount Isa was destined to become one of the world's great underground mines, and would probably be chosen for Australia's first atomic power station.

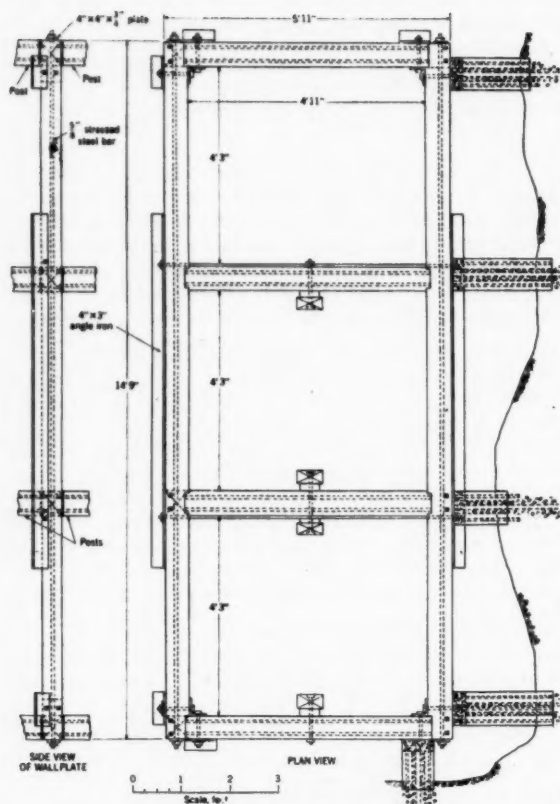
INDO-JAPANESE IRON ORE CONTRACT

A contract for the importation of 1,300,000 tons of Indian iron ore has been concluded between the seven major Japanese steel companies and the State Trading Corporation of India. This information was revealed recently in Tokyo by Mr. S. Tanabe, who earlier this year headed a mission to India representative of the Japanese companies. The purpose of the mission was to conclude the contract now announced.

In his statement, Mr. Tanabe revealed details of the contract. 1,300,000 dry tons of haematite ore (10 per cent allowance tolerated) will be imported for shipments from April, 1957, to June, 1958. The stipulated quality is Fe content above 62 per cent, $Al_2O_3 + SiO_2$ not more than 9 per cent, and sulphur not more than 0.05 per cent. The contract price is 84s., f.o.b. Tokyo per dry ton of ore of 65 per cent Fe. For every 1 per cent difference in Fe content 1s. 6d. will be added or reduced. The S.T.C. guarantees that the amount of iron ore of Fe content below 62 per cent will not exceed 4 per cent of the total importation.

Delivery and loading will be completed as follows: 500,000 tons in Calcutta, 75,000 tons in Vizagapatam, 300,000 tons in Cocanada and Masulipatam, 200,000 tons in Madras, 25,000 tons in Bombay, and 200,000 tons in Kadla and Bhavnagar. Both parties will appoint their agents to handle business procedures by the middle of April.

It is reported that prior to this contract between the Japanese steel companies and the S.T.O., the Kinoshita Shoten, Ltd., an export-import company, and the General Merchandise Corporation, an Indian company in Japan, had signed contracts with India for the imports of 400,000 tons and 100,000 tons of iron ore, respectively. Mr. Tanabe said this is not included in the 1,300,000 tons and the steel companies are not responsible for their importation.



Plan view of shaft set assembly showing location of blocking and side view of prestressed wall plate with stressed steel rod through plate

THE Banner mine of the Banner Mining Co. is in the Virginia mining district of south-western New Mexico about five miles south-west of Lordsburg, Hidalgo County, N. Mex. The mine produces about 235 tons per day and employs approximately 75 men underground, 24 men on the surface, and 7 men in a supervisory capacity.

The Bonney shaft was sunk vertically to the 13th level with levels at approximately every 135 ft. and numbered consecutively. The elevation of the shaft collar is 4,690 ft.; it has been sunk to a depth of approximately 1,440 ft.

The Bonney shaft formerly was used for the downcast ventilation shaft but now is used for the upcast or exhaust air from the mine. The temperature and humidity of the exhaust mine air were quite high and tended to increase the rate of decay considerably in the shaft timber to such an extent that it was necessary to constantly replace timber sets. Sloughing of sidewalls in certain sections of the shaft has also presented problems of hazard and expense.

Owing to the excessive cost of maintenance, the hazards involved by the continued use of conventional timber, and the planned increase in ore tonnage to be hoisted through the Bonney shaft, it was decided to install a test section of precast, prestressed concrete members from the 500-ft. to the 400-ft. level, which is through poor ground and has caused considerable trouble in the past.

A second experiment tried in this section of shaft was the use of rock bolts supporting wire netting around the rock shaft walls. Guniting of variable thickness was then blown over the rock bolts and wire netting to protect the wall rock from sloughing due to moisture and air action. The sidewalls were thoroughly scaled before wire netting and rock bolts were installed. This process eliminated the necessity for lagging around the concrete sets.

At the Banner mine prestressed concrete was more suitable than reinforced concrete.

Casting the Members

Each member was cast in an assembled iron form specially designed for each member to assure accurate placing of reinforcing rods, holes for steel tensioning bars, pinning posts to wallplates, hanging bolts, angle-iron bolts, and for standard sizing and accurate framing. After the forms were poured, vibrators were used to cause proper settling and filling. End-plates and dividers were cast solid with four $\frac{1}{2}$ -in. reinforcing rods spaced in each corner about 1 in. from the surface. Posts were cast with a 2-in. hollow centre and four $\frac{1}{2}$ -in. reinforcing rods spaced the same as in spreaders and end-plates. Two of the rods extended about 1 in. from the ends to serve as dowel pins.

Specially prepared high-strength steel bars $\frac{3}{4}$ in. in dia. and 15 ft. 6 in. long were placed in the $\frac{7}{8}$ -in. hollow core-hole through the precast wallplate. Steel bearing-plates 4 in. by 4 in. by $\frac{1}{2}$ in. with a $\frac{7}{8}$ -in. dia. hole in the centre were then placed over the steel bars in contact with the end of the precast wallplates. A heavy $\frac{1}{2}$ -in. steel washer was then placed against bearing plates and a $\frac{1}{2}$ -in. high-efficiency nut with tapered threads was turned on to the end of the bar. The bars were provided with a long tapered thread on one end and a short tapered thread on the other end. The nut bearing on the washer at one end was tightened with a con-

Shaft Supports at the Banner Mine, New Mexico

622,282.4 (789,171-BANNER)

The installation of prestressed, precast concrete shaft supports in 100 ft. of shaft at the Banner Mine, New Mexico, gave a satisfactory permanent installation in a section of the shaft that had given trouble with conventional timbering. The installation was described by the U.S. Bureau of Mines in "Information Circular 7775," from which the following article is condensed.

ventional wrench after which a specially designed hydraulic jack was fastened to the long threaded end of the stress-steel bar and pressure applied against the 4 in. by 4 in. by $\frac{1}{2}$ in. bearing plate.

An internal stressing force of 30,600 p.s.i. was applied by the hydraulic jack, and the bearing-plate nut on this end was tightened securely to permanently lock the pressure of the bar against the plates. During the stressing operation the bar was elongated approximately $\frac{1}{4}$ in. When this internal stress was applied, the plastic flow or compressibility of the concrete ceased after a short period of time, and the wallplates retained a permanent compression of approximately 26,000 p.s.i. Since the stress bar is free through the member, the pressure of the stress bar on the end-plates is transferred through the member. After prestressing, the characteristics of the concrete members were entirely changed. They became flexible and highly resistant.

Force of Resistance

All members are designed for 4,000 p.s.i. concrete; a 28-day test showed an excess of 5,000 p.s.i. Stress-steel bars and other metal parts are treated with a heavy coating of asphalt for protection against rusting or deterioration. Blocking beams for concrete sets were made of special 8-in. by 8-in. by 8-in. building blocks with a 2-in. by 3-in. centre

core and three $\frac{1}{2}$ -in. transverse holes cast about 1 in. from the upper and lower edges, one hole at the top and two at the bottom.

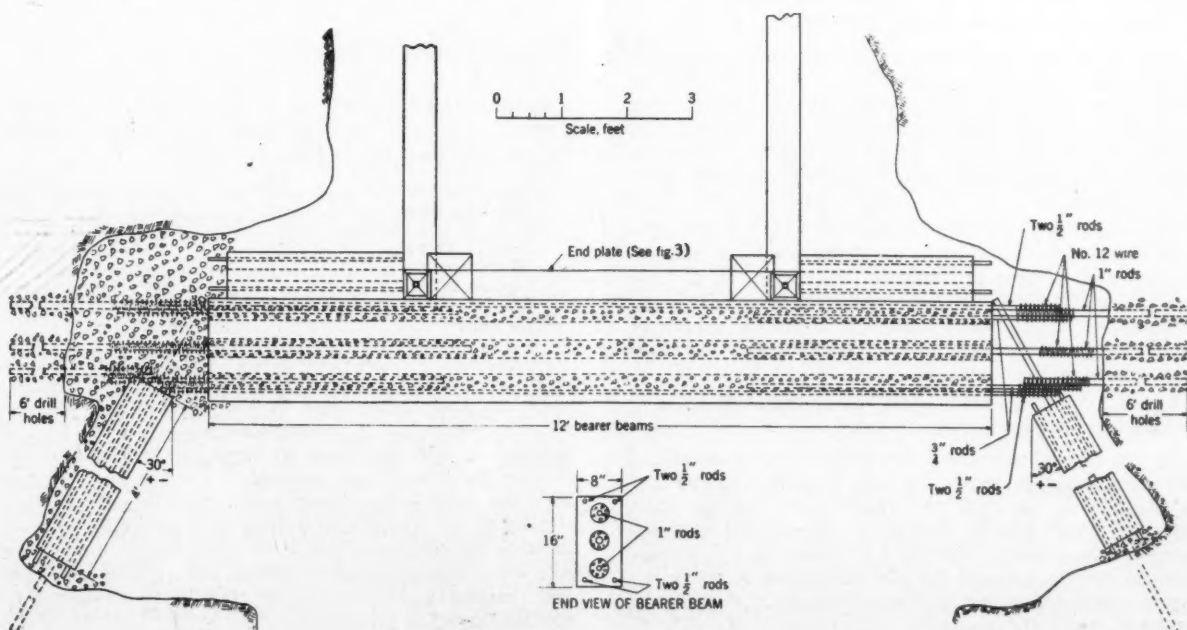
The first step before the precast, prestressed concrete members were installed was to select a suitable place to install four preassembled pretensioned 8-in. by 16-in. (in cross-section) bearer beams. The place selected was approximately 14 ft. below the 500-ft. level.

The four bearer beams were 8 in. by 16 in. by 12 ft. They were made with three 3-in. hollow cores and four $\frac{1}{2}$ -in. reinforcing rods protruding about 12 in. from each end for ties into the end concrete after being positioned in the shaft. The top and bottom hollow-core holes were filled with concrete after $\frac{1}{2}$ -in. rods were placed in them from each end just before positioning the beam; likewise, a 1-in. rod was placed in the centre hollow core at each end and grouted in. Three holes were drilled into the centre with 1-in. drill steel and one drilled from 7 to 8 in. above and below the centre of the recess in the sidewalls of the shaft to a depth of 5 to 6 ft. 1-in. drill steel was grouted into these holes and allowed to protrude to a maximum distance, so as not to interfere with the positioning of the bearer beam.

Structure from the Bearer Beam

When the bearer beam was lowered in place, the rods in the centre hollow-core hole were pulled out to protrude as far as possible into the end areas to be concreted. 1-in. drill holes were also drilled in notches in the sidewalls of the shaft directly under and about 5 ft. down from the base of the bearer beam. These holes were drilled to a depth of about 4 ft. and at plus- or minus-30 deg. angle. A preassembled, pretensioned 8-in. beam of proper length was placed on end in this notch, and a 1 in. drill steel of proper length to extend from the bottom of the drill hole to several inches above the top of the beam was placed through the hollow core of the beam and into the drill hole. The drill steel in the drill hole and the base of the beam were grouted in place and the hollow corehole filled with cement. The bearer beam was then lowered into position and No. 12 wire used to

End view showing installation of bearer beams and securing of shaft sets on bearer beams



tie all protruding rods together and to aid in reinforcing the concrete ends. Forms were then built around the ends of the beams to the recesses in the sidewalls and filled with a 1:3 mix of concrete. After the concrete at the ends of the bearer beams had a proper set, installation of the concrete shaft members was begun. Bearer beams from actual tests were capable of supporting about 18 tons each, and the total possible load per bearer beam was approximately 6½ tons. The old shaft timber was removed and gunite applied.

Wallplates and end-plates were placed in a level position on the bearer beams and securely blocked and concreted in place. End-plates fit into 1 in. recesses cast in wallplates. Two tie rods are used, one on each side of each divider, and the wallplates are cast with an arch so that pressure is brought on the dividers when the ends of the wallplates are drawn in by means of bolts to fit the end-plates.

Holes through the centre of end-plates and dividers were provided to bolt 5 in. by 1½ in. channel guide supports, which secure the 6 in. by 3½ in. fir guides in place. Steel plates 4 in. by 4 in. by ½ in. at the ends of the wallplates were used to transfer the tension from bars to compression through precast concrete wallplates. A 4 in. by 3 in. angle, 8 in. to 10 in. long, was bolted to the bottom corner angle bolt on the outside at the ends of each wall and end-plate and extended 2 in. below the bottom of the plates to support concrete blocking and aid in securing the sets in place. The same size angle, 7 ft. 6 in. long and in some places longer, extending 2 in. below the wallplate, was centred on the outside of the wallplates and was secured by the tie rod bolts.

Support from Blocking Beams

All blocking beams were placed at a slight angle from the concrete members down to the shaft walls to enable each blocking beam to support part of the weight of the concrete shaft members as well as to hold the alignment. The ½ in. reinforcing tensioned rods, grouted in the blocking beams, were allowed to protrude as far as possible into the end grouting areas and served as reinforcement in the grout and as ties to the blocking beams. All surface on the shaft sets was cleaned and roughed around the areas to be grouted to assure proper bonding.

The maximum distance from the walls of the shaft to the precast shaft sets was about 12 ft., and the minimum distance was a few inches. Twelve blocking beams were used to a set when distance to walls was 12 or more inches—four on each side and two on each end. When distance to wall was less than 12 in., metal forms were built and filled with concrete.

The blocking beams were positioned with the two ½-in. reinforcing rods on the bottom and the one ½-in. reinforcing rod on the top side. Forms of lightweight metal were built around the base and sides of the blocking beams and completely encased the wallplate and post at points of junction to hold the concrete grout in place until the grout had time to properly set.

Two ½-in. hanging bolts were used on each side between wallplates in the end compartment.

By use of these methods the shaft walls are stabilized, and sloughing is prevented by the use of wire netting that is secured by rock bolts and gunited; the concrete shaft members installed in this shaft are permanent and eliminate many of the hazards resulting from decay and failure of conventional timber; and the hazardous work of re-timbering is eliminated in the area where concrete shaft members and gunite are used.

Health and Safety in the Mining Industry

RECENT work on dust suppression by the Ontario Mines Accident Prevention Association has indicated the desirability in wet drilling of maintaining high water velocity through the flushing ports in the bit. For a given water pressure more holes, or larger holes, in the bit resulted in the generation of more dust. Water pressures between 80 and 100 p.s.i. are suggested as probably most suitable.

Importance of Dust Suppression

Results of over 150 tests involving 10,000 ft. of drilling, chiefly in a quartz porphyry, again focus attention on the importance in dust suppression of good machine design and maintenance. Use of the machine with a vented front head is advocated. Much importance is attached to preventing air from becoming entrained in the flush water and the best means to this end still appears to be the use of shank-end ring seals. Up holes were found to produce several times more dust than down hole, large bits more than small bits and dull ones more than sharp ones.

Adequate ventilation remains the most straightforward solution to wet drilling dust problems.

The Joy "Microdyne" dust collector is a welcome addition to available equipment. This unit is only 1/10th to 1/20th the size of other collectors of equivalent capacity.

Noise hazard has been reduced at a mine in British Columbia by fitting 50 to 100 ft. hoses to the exhausts of diamond drills and percussive machines.

The American National Safety Council staged in 1955 an International Campaign for the Prevention of Falls of Ground Accidents. Results published within the past year claim that the campaign was responsible for a 29 per cent reduction in the frequency of injuries due to falls. No unusual care was employed. The campaign merely directed attention to the need for safety, created interest in finding solutions, and encouraged action where it was indicated.

Principal Sources of Danger

Statistics recently published by the U.S. Bureau of Mines covering U.S. mine accidents from 1932 to 1954 indicate the principal sources of danger as follows:

Falls of ground	...	...	15.8% of total
Handling Materials	...	...	13.6% of total
Hoisting and Haulage	...	...	11.6% of total
Falls of Persons	...	...	8.2% of total
Machinery	...	...	5.7% of total
Explosives	...	...	0.9% of total
Electricity	...	...	0.6% of total
All others	...	...	43.6% of total

Analysis of accidents sustained by employees at the Hollinger mine, Ontario, showed that the major causes were inattention, absentmindedness or improper attitude on the part of operatives. Based on these findings a job hazard programme was formulated and implemented during 1956. It is worthy of note that, although this programme resulted from an independent investigation, the broad approach and mode of application echoed the principles already showing improvements elsewhere. One factor in common with other successful safety schemes is the assistance asked and received from the man on the job in formulating standard safe job procedures.



Night view of the Zenica steel works, Yugoslavia

FOLLOWING a period of expansion dating from 1892, when operations were first begun, the Zenica steel plant, Yugoslavia, is now in the final stages of completion. The original conception called for a plant at Zenica that would supply the local market with commercial steel from ores obtained from the mines at Vares. These mines still supply the plant, the ores being transported by rail. The Vares mines are some 70 km. from Zenica, their reserves being estimated at over 150,000,000 tons of iron ore.

production of gas by-products has also been completed and will provide 18,000 tons of tar, 4,300 tons of crude benzol and 4,300 tons of ammonium sulphate a year.

Two blast furnaces of 400,000 tons per annum combined capacity have been operating since 1954 and a third will be completed at the beginning of next year. The plant is equipped with four fixed open-hearth furnaces. In addition, three tilting open-hearth Siemens Martin furnaces produce 600,000 tons a year and a fourth unit will add a further 100,000 tons to the overall output. Thus, when all developments have been completed, the Zenica steel works will produce 715,000 tons of crude SM steel, and 35,000 tons of other steels per annum.

The rolling mill system of the reconstructed plant has a capacity of 200 tons. The new blooming mill, purchased

The Largest Steel Plant

In Yugoslavia

The Kakanji mines are likewise situated in the neighbourhood of Zenica. In future these mines are to supply coking coal and, together with the Breza mines, coal for gas production as well.

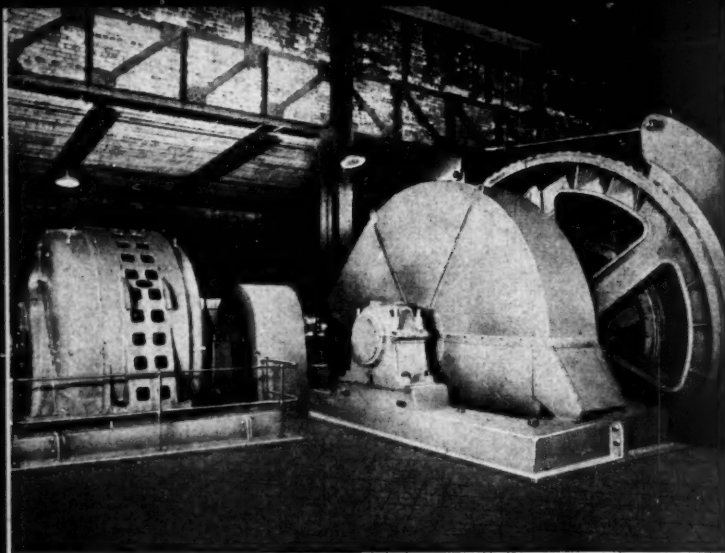
Originally, operations at Zenica were begun to ensure sufficient quantities of iron and steel for the further development of Yugoslavia. A reconstruction and extension programme was begun in 1948, with the result that the plant began exporting in 1955 and last year exported 120,000 tons of various iron and steel products. This output was dispatched to India, Cyprus, Syria, the Soviet Union, Jordan, Rumania, Eastern Germany, the Lebanon, Bulgaria, Brazil, Uruguay, Switzerland, Greece and the United Kingdom.

Currently, the coking plant with four batteries and an annual production capacity of 600,000 tons of coke has been completed and is operating at maximum output. This tonnage will cover the requirements of the three blast furnaces in so far as coke is concerned. The plant for the

in the United States, has been in operation for four years, and the new mill, in operation for one year, has a capacity of 75,000 tons. Trial runs are being carried out in the wire rod mills for the production of 6 mm. to 12 mm. pieces. The wire rod mills have a capacity of 80,000 tons, a mill for medium sections can produce 130,000 tons each year, and in all, the total capacity of the Zenica rolling mills is 550,000 tons.

The construction of the Zenica steel works has contributed greatly to the welfare of Yugoslavia's social and economic life. The plant employs a labour force of 11,500, and the population of the town of Zenica itself has risen by 400 per cent since the establishment of this industry in the district, namely from 11,000 persons to 45,000 persons.

Modernizing Britain's Coal Mines

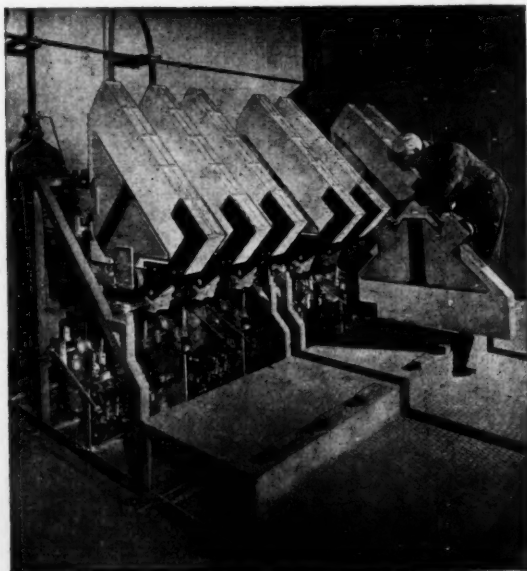


THE project for modernizing Cwm colliery in the Rhondda area is of immense importance to the mining communities over a wide area of Glamorganshire. When reconstruction is completed, which is expected in four to five years' time, Cwm colliery will be the biggest of the South Wales pits, and will open up the huge reserves of top-grade coking coal which lie beneath 10 sq. m. of the Glamorgan countryside.

Cwm is already linked underground with the Maritime colliery and will shortly be connected with the workings at Coedely. Miners at both these pits will continue to go underground by their local shafts, but all the coal will be raised at Cwm, where the centralized coal washery and coke oven plant are situated.

In connection with this project, contracts were placed with The General Electric Co. Ltd., covering a fully automatic 3,000 h.p. skip winder, a double-drum service winder, coal preparation plant and two 8,000 kW turbo-alternators; and with Qualter Hall and Co. Ltd. for the skip plant and spiral chutes. The A.C. winding plant is the first fully automatic winder to be commissioned using the G.E.C. patented system of speed control, and is also the first to operate at 11,000 v.

The winding engine, which has a single parallel drum 20 ft. dia. by 13 ft. wide, is driven through a double helical single reduction gear by a 3,000 h.p., 11,000 v. slip-ring motor and is designed to raise 510 tons of coal per hr.



from a depth of 2,268 ft. Two skips, each of 12 tons capacity, with guillotine discharge doors, are used in balance. The time of a complete winding cycle is 85 sec., giving 42 winds per hr.

Coal from workings at two levels is fed by mine car tipplers via an apron plate feeder on to a conveyor belt, the coal from the upper level descending through spiral chutes. The conveyor transports the coal to the bottom of the shaft where it is fed through a bifurcated chute into two weighing pockets, one for each skip. Loading of the empty skips from the weighing pockets is automatic and is initiated by pneumatic valves which are operated by skates on the skips, so that for running the plant below ground men are only called upon to work the tipplers.

Above: The 3,000 h.p. automatic skip winder at Cwm Colliery

Below: The 11,000 v. stator reverser, with one arc chute raised for inspection of contacts

On reaching the pithead, the guillotine discharge door of the skip is opened by an electric magnet which is raised pneumatically so that the coal is released into receiving hoppers which feed the conveyor belt leading to the washery. After a predetermined time delay, the skip door is automatically closed and the magnet released. Pneumatically-operated doors in each hopper are interlocked so that only one can be opened at a time, thus forming an air-lock.

Should both weighing pockets at the pit bottom be full, the conveyor is stopped but automatically restarts as soon as one of the pockets has been emptied. Similarly, if a full skip arrives at bank before the appropriate hopper has been cleared of coal, the discharge sequence is automatically delayed by pneumatic and mechanical interlocks until that hopper has been cleared.

The stator reverser is deserving of mention as it is the first of its type to be built for 11,000 v. service. The reverser is air-operated through electro-pneumatic valves and is smooth and positive both on opening and closing. Normally the mine air supply is used but a standby compressor starts automatically in the event of failure of the normal air supply. This compressor is also used during periods when the main colliery air compressors are not working. Should the air pressure fall below the value necessary to ensure reliable operation of the contactors, a pressure switch in the winder safety circuit trips the main circuit breaker and locks out the winder.

Machinery and Equipment

Novel Mucking Tool

A new design of loader, developed in Sweden by Luossavaara-Kiirunavaara AB (LKAB) that is expected to revolutionize the loading technique, has been presented by the owner of the patent, Nilsons Maskin AB, Sundbyberg, Sweden. The tool is a side dump bucket of great scraping and loading capacity for blasted rock in mines, tunnels and other sites with limited space.

The Caterpillar No. 6 Traxcavator has been used as basic machine during these tests, but now the Libu side dump bucket is used on the Caterpillar No. 977 and 955 Traxcavators.

The Libu side dump bucket is without sides and can be dumped to either side. It has been thoroughly tested for about two years on authentic jobs. As turning of the Caterpillar Traxcavator with the Libu bucket is practically eliminated, the loading capacity has been raised between 40 and 60 per cent compared with an ordinary front dump Traxcavator of the same size. This working method gives higher capacity, as the machine travels a shorter distance; less cost compared with an excavator, as no extra bulldozer is needed, and less wear on tracks, as the machine does not have to be turned as an ordinary front dump loader.

Loading time per truck is 6 min. at 8½ buckets per truck, bank material 0.53 cu. m. per bucket and 4.5 cu. m. per truck. Capacity is 45.5 cu. m. per hour. Required working width is 138 in. The

Opposite: The Libu side dump bucket

Below: The C.P. Hemborn dust extractor for quarry work



desired minimum tunnel area is 350 sq. ft. when loading on a 15-ton truck and 258 sq. ft. when loading on a 5-ton truck. These figures are based on the assumption that the Libu bucket is mounted on a Caterpillar No. 6 Shovel.

QUARRY DUST EXTRACTOR

It has been realized for many years that suppression of dust in quarries working siliceous rocks is as important a feature in the welfare of quarrymen as it is mining. As opposed to mining practice, however, there is not the same need to collect the dust in a confined space. The quarry version of the Consolidated Pneumatic Hemborn dust extractor has been developed with quarry requirements in view and consists of an extractor which exhausts the dust to air at a convenient distance.

Briefly the system makes use of a vacuum created in the exhaust unit which sucks out all the dust from the tip of the bit. The extractor is used with special C.P. Hemborn rods and C.P. Hemborn T.C. bits which are produced in all standard sizes.

According to rod size, two or four suction channels in the bit allow the passage of a constant stream of air in through the hole and up through the bit, thus ensuring that the bottom of the hole is kept free of fragments, a point which allows the percussive and thrust action of the drill to proceed without loss of power through rock fragments. This freedom from chippings at the bottom of the hole reduces wear on the bit, it being found, for example, that the reaming angle remains true considerably longer than is the case with water suppressed bits.

Fitching or jamming of rods is also greatly reduced with the removal of all loose fragments from the bottom of the hole, a point leading to faster drilling and reduced operator fatigue.

SAFE PHONES FOR MINE RESCUE

Using hearing-aid parts—tiny, low-voltage batteries, transistors, earplugs, and microphones—the U.S. Bureau of Mines has developed an electrically-powered portable telephone system that can be used safely during rescue operations in gassy coal mines.

Laboratory tests showed that no short-circuit in the system could cause a spark hot enough to ignite gas or coal dust. The Bureau then tried it out during practice maneuvers in its experimental coal mine at Bruceton, Pa.

Early telephone systems could not be used in gassy mines because they required too strong an electric current. More recently, development of a safe low-voltage system was blocked by the hot filaments in vacuum tubes, which could ignite gas if a tube were broken. Early rescue crews communicated with their base by tugs on a lifeline, using a prearranged code. This method could not be depended upon when the rescue crew was more than 1,000 feet from base. Later, voice-powered telephones were introduced. These extended the range somewhat and made two-way communication easier. They are still used.

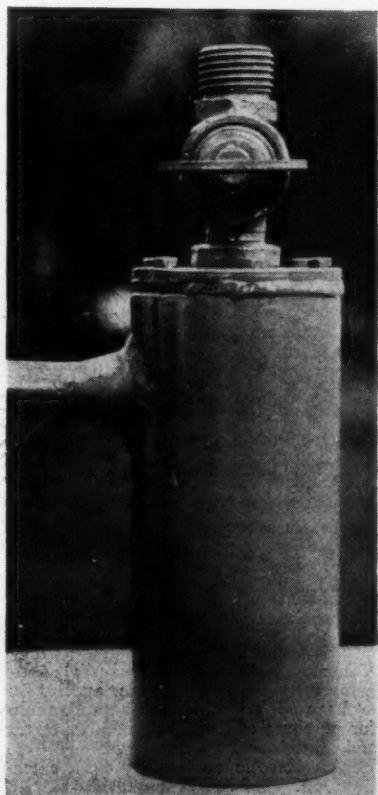
The Bureau's new electrically-powered system was made possible by transistors, which eliminate the need for vacuum tubes with their hot filaments and fragile shells. Moreover the use of transistors results in a lighter weight telephone assembly, an important item in recovery operations.

TRIPLE ACTION IMPACT BREAKER

The Kennedy Cuber Senior breaker manufactured by Kennedy-Van Saun Manufacturing and Engineering Corp., United States, is described as a dual rotor, up-running breaker featuring a multi-stage, triple action reduction principle and regulated flow.

This heavy duty impact breaker is designed for primary and secondary breaking of non-abrasive stone and like material in a single unit. An adjustable baffle and provision for varying operating speeds presents the versatility to accommodate the different breaking characteristics of various rock types. The Cuber Senior will handle any quarry rock which will freely pass its 36 in. x 48 in. feed opening and, in many types of rock, can be operated in a closed circuit to produce 100 per cent passing 1 in.

The feed opening of the Model 3648 is 36 in. by 48 in., speed is 550 to 850 r.p.m. and 150 h.p. to 250 h.p. are required. Capacity is up to 350 tons per hour in reducing well shot quarry run limestone.



MINING MISCELLANY

The joint Thai-British Ao Makam Tin Dredging Co. has begun operations at Phuket.

Three West German geologists have left for Havana to study iron ore deposits there.

It is reported from Brazil that large deposits of tin have been discovered in the municipality of Baturite in Ceara State.

Up to the year 1960, the Polish Ministry envisages the building of 26 factories for the production of prefabricated elements from reinforced concrete for coal mines.

Turkey now produces 18,500 tons of coal a day. About £400,000,000 has been invested in the coal fields since 1950. Output is to be increased until 10,000,000 tons a year are being mined.

The U.S. Geological Survey celebrated its 78th anniversary on March 3 by noting that the Survey's previous achievement records in mapping were topped in the fiscal year, 1956, by the publication of some 3,019 new or reprinted maps.

A six-man team of specialists from the United States went to British Guiana early in October, 1956, to carry out a mineralogical survey. They are particularly interested in the southern part of the colony.

Plans are going ahead to develop a new deep iron ore mine to be jointly owned by St. Joseph Lead Co. and Bethlehem Steel Co. The property, discovered by St. Joseph Lead, is about 50 miles south-west of St. Louis, United States.

At 1,734,000 tons, West German potash (K₂O) production in 1956 was 10 per cent up on the previous year. Of this amount, 949,000 tons was taken by the home market in comparison with 898,000 in 1955. Exports rose from 680,000 tons in 1955 to 786,000 tons last year.

Fison-Airwork has been operating two Westland Whirlwind helicopters under charter to Shell-B.P. Petroleum Development Co. of Nigeria for the past 12 months, and has now placed an order with Westland Aircraft for a fourth Whirlwind. The machines are used for the transportation of heavy drilling equipment, amongst other tasks.

Exports of iron ore from the Vale do Rio Doce Company, Brazil, totalled 2,270,000 tons in 1956, a slight increase on the previous year's export figures. It is hoped to increase exports in 1957 to 2,800,000 tons. During 1956 the company paid off the last instalment of the loan of \$14,000,000 made by the Export-Import Bank in 1942.

LKAB, the big Swedish Lapland iron ore mining company to be nationalized in October this year, is planning to build a new ore shipping harbour at Sandoklubb on the Gulf of Bothnia. Total costs are estimated at about 100,000,000 kroner at 1955 prices.

A coal purifying plant, worth \$U.S.2,000,000, has been bought from Czechoslovakia for the Rio Turbio coal-fields in Argentina. The 6,000 kW plant to supply the necessary power will come from Italy and will cost \$U.S.1,300,000.

Prometal Produtos Metalicos de Sao Paulo, of Brazil, has built a new factory and will manufacture *sur-affiné* alloys, such as ferro-manganese, metallic manganese, chrome, ferro-titanium, ferro-tungsten, etc. Only national raw materials and refractories will be used.

Three geologists, one from Britain and two from the United States, arrived in Salisbury, Southern Rhodesia, this month to inspect the discoveries of radio-active mineral deposits in the Federation. The geologists will be shown radio-active deposits at Umtali, Lake Nyasa and the Copperbelt, and lithium deposits at Bikita.

Two years ago, the North West Guiana Mining Co. commenced to investigate the possibilities of mining manganese ore in commercial quantities in the North West Districts. The first shipment of ore, amounting to 250 tons, was made on December 13 last year to Trinidad, from the company's mines on Mt. Everard on the Barima River.

The State-owned Companhia Siderurgica Nacional, of Brazil, is installing metallurgical plant at Lafaiete, in the iron and manganese ore region of Minas Gerais, to produce 11,000 tons of ferro-alloys annually at the start. The main production lines will be ferro-manganese and silicon. The equipment has been ordered from Elektro Kemish, of Norway, and includes two three-phase 4,800 kVa furnaces and one of 2,500 kVa.

In Finland, exports of both zinc concentrates, ilmenite and magnetite increased in 1956. About 675,000 tons of ores were exported in January-November, 1956, compared with 514,000 tons for the whole of 1955. A new export was vanadium, exports of which totalled 67.5 tons. The capacity of the Otanmaki vanadium plant is at present 300 tons per annum, which will be doubled later.

The first deep diamond drill hole being put down by El Sol Gold Mines on its magnetite iron ore property at Kesaka Lake, Ontario, has intersected a continuous width of 144 ft. of typical ore material at a vertical depth of approximately 1,000 ft. Subsequently, a footage

of 1,455 has been reached in the hole which is still drilling in ore. On completion of this deep boring, the reserves indicated by drilling on this property will total at least 300,000,000 tons.

Once again all the main courses of instruction were filled to capacity, states the report on the work of the London School of Hygiene and Tropical Medicine for the year 1955-56. New rules laid down by the General Medical Council came into operation on October 1, 1956, and their main provision was the abolition of the certificate. The revised University regulations conform to this pattern and the School's course for the Diploma in Public Health will now be continuous over the academic year.

PERSONAL

Col. Sir Ellis Robins has left the boards of Bancroft Mines, Rhodesia Broken Hill Development Co., Rhodesia Copper Refineries, Nchanga Consolidated Copper Mines, and Rhokana Corporation. Sir Charles Cumings has joined the boards of the same companies with Mr. E. S. Newson as alternate.

Mr. A. M. Baer has been appointed deputy chairman of the Consolidated Zinc Corporation. Sir George Bolton has been appointed a director.

Mr. J. A. Griffiths has been appointed a director of the National Mining Corporation.

Mr. J. T. B. Welbourn has been appointed chief coal mining engineer to Powell Duffryn Technical Services Ltd.

Mr. I. Dorr has been appointed a director of Nu-Swift in succession to Mr. G. W. Smith, who recently resigned.

Mr. R. Catherall has been appointed a director of Solartron Research and Development Ltd.

Translations of Russian technical matter requested under the D.S.I.R. co-operative scheme, will shortly become available. Apply to T.I.D.U., Cunard Building, Regent Street, London, S.W.1.

CONTRACTS AND TENDERS

The I.C.A. has announced the following future authorizations:—

South Africa

Three hundred and eighty-five tons lead ingot. Closing date May 1, 1957. Ref.: E.S.B./9002/57. Telephone Chancery 4411, extension 738.

Korea

Importers listed have either applied for or have been granted sub-authorizations for purchase of listed commodities. Zinc and tin ingot. Ref.: E.S.B./9888/57 I.C.A. Telephone Chancery 4411, extension 360.

Metals and Minerals

World Production of Bauxite Soars

The Bureau of Mines, U.S. Department of the Interior, estimates the total world production of bauxite in 1956 at about 16,750,000 tons; this compares with an estimated 15,550,000 tons in 1955 and a total of about 10,700,000 tons in 1951.

Preliminary figures released by the Bureau of Mines indicate that U.S. domestic production of bauxite at 1,737,726 tons was about 3 per cent lower than in 1955, largely as a result of low third quarter production when mining was affected by the strike in August. Imports of bauxite from other countries for U.S. consumption were about 16 per cent higher than in 1955.

The gap between U.S. domestic supplies and consumption has widened, due to continued expansion of the aluminium industry. In 1956, imported bauxite represented 78 per cent of the new bauxite supply, compared with 74 per cent in 1955 and 65 per cent in 1953.

Jamaica maintained its position of leading foreign supplier of bauxite to the U.S., followed closely by Surinam, which accounted for 46 per cent of the total. As compared with 1955, imports of metallurgical grade bauxite from Jamaica during 1956 increased by 18 per cent, those from British Guiana by 13 per cent, and those from Surinam by 13 per cent.

The first bauxite imported into the U.S. since 1952 from other than South American or Caribbean countries came from Kassa Island off the coast of French

Guinea during the first quarter, when Alcoa purchased 30,000 tons from this source to test suitability of West African ore for its plants.

A total of 148,590 tons of calcined refractory grade bauxite was imported from British Guiana, representing an increase of 38 per cent from 1955.

The suspension of statutory duties on imported bauxite was continued by Act of Congress for an additional two years, ending July 16, 1958. This year suspension of tariffs has been extended to cover alumina, which will be imported free of duty for a similar two-year period.

At the end of 1956, the rated alumina plant capacity in the U.S. was estimated to be 3,501,000 tons a year. Since this is inadequate to support the programmed expansion of primary aluminium capacity, four aluminium companies have programmes under way to increase their facilities substantially. Completion of projects now under construction by Alcoa, Kaiser, Reynolds and Olin Revere Metals will increase the potential alumina capacity of the U.S. to about 5,000,000 tons. This is sufficient to support 2,500,000 tons of primary aluminium production.

Having regard both to the rapid growth in the production of primary aluminium in North America and Europe, as well as to the large projects currently in progress for stepping up the production of bauxite and alumina in the Caribbean and else-

where, the outlook is for a further sharp rise in world outputs during 1957.

EASIER MANGANESE TONE

As can be seen from our weekly list of metal and ore prices, since their peak level of 135d. to 150d. per lb. unit c.i.f. Europe, reached in January this year, prices of Indian ferro-grade manganese ore have recently displayed a decidedly easier tone. Buyers generally are reported to be holding back, presumably partly in anticipation of prices moving still lower, but also, it is believed, because many of them on the Continent, especially West Germany and France, are fairly well covered for the time being. On the other hand, India and other producing countries have not been offering unduly. In the U.S. demand is not particularly impressive, possibly because of the still rather uncertain outlook for steel production in that country. Generally speaking, the demand at present circulating is almost entirely for the higher grades of ore. A factor in the market at the moment is, of course, the question of freight. Rates from India are inclined to soften and the resumption of navigation through the Suez Canal could result in a more pronounced move in this direction.

In 1956, the United Kingdom imported some 444,044 tons of manganese ore from

LONDON METAL AND ORE PRICES, APRIL 17, 1957

THE WEEK ON THE L.M.E.

	April 11		April 17	
	Buyers	Sellers	Buyers	Sellers
COPPER				
Cash ..	£241½	£241½	£240½	£240½
Three months ..	£242	£242½	£241½	£241½
Settlement ..	£241½		£240½	
Week's turnover	6,650 tons		4,025 tons	
LEAD				
Current ½ month	£112½	£113	£111½	£111½
Three months ..	£112½	£112½	£111½	£111½
Week's turnover	2,200 tons		2,600 tons	
TIN				
Cash ..	£769	£771	£777	£778
Three months ..	£766	£767	£771	£771½
Settlement ..	£771		£778	
Week's turnover	920 tons		900 tons	
ZINC				
Current ½ month	£98½	£91½	£98	£98½
Three months ..	£94½	£94½	£94½	£95
Week's turnover	5,075 tons		3,075 tons	

METAL PRICES

Aluminium, 99.5%, £197 per ton
 Antimony —
 English (99%) delivered, 10 cwt. and over £210 per ton
 Crude (70%) £200 per ton
 Ore (60%) bases 23s. 6d./24s. 6d. nom. per unit, c.i.f.
 Arsenic, £400 per ton
 Bismuth (min. 1 ton lots) 16s. lb. nom.
 Cadmium 12s. 0d. lb.
 Cerium (99% net), £13 18s. lb. delivered U.K.
 Chromium, 7s. 2d. lb.
 Cobalt, 16s.-19s. lb.

ORES AND OXIDES

Bismuth ..	30% 5s. 0d. lb. c.i.f.
	18/20% 1s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable) 48% ..	£17 8s. 0d. per ton c.i.f.
" Hard Lumpy (45%) ..	£17 8s. 0d. per ton c.i.f.
" Refractory 40% ..	£12 15s. 0d. per ton c.i.f.
" Smalls 42% ..	£16 5s. 0d. per ton c.i.f.
Baluchistan ..	£18 15s. 0d. per ton c.i.f.
Columbite, 65% combined oxides, high grade ..	185s/197s. 6d. per unit
Fluorspar—	
Acid Grade, Flotated Material ..	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% Ca F ₂) ..	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 3½% Li ₂ O ..	£8-£10 per ton f.o.b. Beira
Lepidolite min. 3½% Li ₂ O ..	£8-£10 per ton f.o.b. Beira
Amblygonite basis 7% Li ₂ O ..	£28-£32 per ton f.o.b. Beira
Magnesite, ground calcined ..	£28 0s./£30 0s. d/d
Magnesite Raw (ground) ..	£21 0s./£22 0s. d/d
Molybdenite (85% basis) ..	8s. 5d. nom. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO ₂ ..	£64/£65 per ton c.i.f. Aust'n
Ilmenite 52/54% TiO ₂ ..	£11 per ton c.i.f. Malayan
Wolfram and Scheelite (65%) ..	157s. 6d./165s. 0d. per unit c.i.f.
Manganese Ore Indian	
Europe (46%-48%) basis 165s. freight plus 17½% surcharge ..	145d. per unit c.i.f.
Manganese Ore (43%-45%) ..	116d. per unit c.i.f.
Manganese Ore (38%-40%) ..	111d. per unit.
	(including duty)
Vanadium —	
Fused oxide 90-95% V ₂ O ₅ ..	£12½-£13½ per unit c.i.f.
Zircon Sand (Australian) (65-66% ZrO ₂) ..	£20 per ton c.i.f.

Germanium, 99.99%, Ge. kilo lots 3s. 4d. per gram
 Gold, 250s. 4d.
 Iridium, £27/29 oz. nom.
 Lanthanum (98/99%) 15s. per gram
 Manganese Metal (96%-98%) £310
 Magnesium, 2s. 5½d. lb.
 Nickel, 99.5% (home trade) £600 per ton
 Osmium, £20/22 oz. nom.
 Osmiridium, nom.

Palladium, £8 0s./£8 10s. oz.
 Platinum U.K. and Empire Refined £33/£33½ oz.
 Imported £33½/£33½ nom.
 Quicksilver, £86 ex-warehouse
 Rhodium, £42 oz.
 Ruthenium, £15/£17 oz. nom.
 Selenium, 8s. nom. per lb.
 Silver, 79½d. f. oz. spot and 79½ f'd.
 Tellurium, 15s./16s. lb.

all sources compared with 405,102 tons in 1955 and 501,567 tons in 1954. The U.K. figures are interesting in that they include useful tonnages of ore from the U.S.S.R. In 1956, the U.K. imported 146,439 tons from the U.S.S.R.; in 1955 and 1954 imports were 118,233 tons and 126,170 tons respectively. It is understood that further contracts have been entered into with the U.S.S.R. for this year for tonnages believed to be approximately in line with last year's figure. It is believed that only high-grade ore is bought from the U.S.S.R. and that prices paid are about in line with open market prices allowing, of course, for any difference in freight from U.S.S.R. and Far Eastern shipping points.

QUICKSILVER FIRM AT £86

The quicksilver market in London appears to have settled down at the higher level recently attained of £86 per flask ex-warehouse London. Supplies of physical metal on the spot are still by no means plentiful, though, so far as can be ascertained, this has caused no embarrassment to buyers.

No worthwhile improvement in supplies is expected within the foreseeable future, since shipments to the U.K. from both Spain and Italy are likely to remain insufficient to permit useful quantities being put into warehouse for normal day-to-day business because of the position

of the Spanish and Italian producers, who are still well committed. Thus no material change from the present price level is envisaged for the time being, despite the availability of certain quantities of Mexican metal at between £83 and £84 per flask c.i.f. It is believed that what Mexican material has been offering to the U.K. has been quite well taken up, and that most of Mexico's production must be gravitating towards the U.S.

CHROME FOR LOCOS

U.S. locomotives and related equipment are to be exchanged against Turkish chrome ore under a recent agreement. The U.S. government had earlier rejected a proposal to reopen barter deals of wool against Turkish chrome ore, following a tentative offer made by a Turkish group to the Commodity Credit Corporation. Under the deal the ore will consist chiefly of medium material and delivery will extend over several years.

Turkey is making extensive efforts to sell lower grade ores. The seller can now use 100 per cent of proceeds from lower grade chrome ore exports to buy equipment, whereas in the case of exports of higher grade only 10 per cent can be used to buy equipment.

Business on the U.S. chrome market has been quiet and the view has been expressed that buyers are holding off in anticipation of lower freight rates.

appreciable increase in either the motor or canning industries will have an immediate effect on the price. During its last month of production in January the Texas smelter produced 1,750 l.tons.

Figures for tin consumed in tin plate in the U.S. were also issued by the Bureau of Mines and this showed that there was an overall increase of 5 per cent in the manufacture of tin plate in 1956 as compared with 1955 and the amount of tin metal used rose from 33,700 to 34,900 tons which is only an increase of 4 per cent reflecting the continued changeover from the hot dipping process to electrolytic plating. In fact, of the total output of tin plate in 1956 only 19 per cent was produced by the older method.

On Wednesday morning the Eastern price was equivalent to £790½ per ton c.i.f. Europe.

CONTANGO FOR LEAD

The lead market has been characterised by the emergence of a contango once more and it is understood that metal is in fairly good supply throughout the country, probably due to the availability of the metal last sold by the U.K. Government. Trading on the Exchange, however, has been very light, reflecting that there is nothing other than purely normal business being transacted. The British Bureau of Non-Ferrous Metals Statistics show that during February the stocks of lead in this country fell from 41,433 l.tons to 36,900 l.tons, whilst the total consumption for the first two months of the year is given as 58,876 tons as compared with 61,137 tons a year ago, which would seem to support the argument of those who contend that, generally speaking, the industrial difficulties in this country have not resulted in any market cutback in the use of lead.

COPPER • TIN • LEAD • ZINC

(From Our London Metal Exchange Correspondent)

Last week saw a continuance of minor fluctuations and little new business in the metal markets and it seems that only routine business is being transacted by consumers who are still living off their stocks to a certain extent. The only effect the Budget had on markets was to create a weaker undertone, as it was considered that there were no alterations in the Government's financial policy which were helpful to industry as a whole and with no immediate tax reductions there was nothing to cause a surge of optimism. (In America, on the other hand, there are signs that opposition to the Administration's Budget proposals is growing and that there is now a slight hope that some measure of tax reduction may be initiated.) Probably the most important influence this week which has helped to maintain prices has been the visible deterioration in the Near Eastern situation and the realization that the clearing of the Canal has not solved any of the problems which have to be faced.

COPPER EASIER

After the fall in the copper market following the Budget, prices have shown very little alteration, and the contango remained between 15s. and £1 per ton with the weekly stocks showing an increase of 75 tons at 3,997 tons, the news that the strike at El Teniente had ceased being counter-balanced by the political news mentioned above. The initial fall in London resulted in a contraction of business in the United States and custom smelters' prices fell back to 31 c. per lb. whilst copper for export was

offered as low as 30½ c. per lb.; in both cases, however, without finding much business.

The U.S. brass mills, recognizing the lower price of the red metal, reduced the prices of their products by 2 c. per lb., making the price of yellow brass free cutting rods now 35.69 c. per lb.

*

From Chile it is understood the strike there was settled in such a way that there should be no further labour trouble in the foreseeable future. During the week it became known that the 1956 production of Chuquicamata was 15 per cent above that of 1955, whilst at Potrerillos the gain was 6 per cent. Machinery is now arriving at the new copper refinery at Papudo for an initial capacity of 150,000 tons of blister yearly plus an electrolytic production of 42,000 tons. Eventually the capacity is expected to be expanded to 450,000 tons of blister and 63,000 tons of electrolytic.

U.S. TIN STOCKS LIGHTER

The tin market has been more active with a steady undertone. The backwardation has remained a little under £5 per ton although stocks in official warehouses again decreased by a further 47 tons to 502 tons. The consumption of tin in America in January showed a welcome increase at 8,000 l.tons as compared with 7,300 l.tons in December and provisional figures show that the stocks of tin (outside Government-owned stocks) declined during the month of January by 3,500 tons to 39,300 tons and metal afloat was also lower. It looks, therefore, as if any

ANXIETY OVER U.S. ZINC POSITION

The zinc market is still affected by barter deals which have kept the market tight of metal for nearby delivery and which has been reflected in the fluctuation of the backwardation which still remains at a very high figure. The magnitude of this backwardation has, however, resulted in some small increase in offerings from the Continent and it would appear that this happens when the backwardation is over £4 per ton. Consumer demand is reported as being satisfactory and offerings of Russian and Polish zinc are still available.

In the U.S., demand has become very patchy and more and more people are beginning to wonder what will happen to the zinc price if the government lessens in any way its support of the market. The U.S. consumption in January amounted to 89,600 s.tons, which is 10 per cent above the monthly average for 1956. The smelter output of slab zinc declined 5 per cent from December at 93,500 s.tons, and stocks at smelters increased by 10,400 s.tons to 78,974 s.tons. Consumers' stocks, however, diminished by about 10 per cent to 90,700 s.tons. Imports of both concentrates and slab metal decreased, the former by about 7 per cent, while the latter dropped from 46,500 tons in December to only 27,500 tons in January, which probably reflects the lull in the barter trade during the month of November.

Closing prices and turnovers from April 12-17 are given in the table on page 495.

Rio Tinto's Spreading Interests

report. The subsidiaries, apart from Rio Canada, incurred a net loss of £107,000, this being mainly due to the fact that many of the operating companies concerned are, or were, still in the development stage. Similarly, Rio Canada made a loss in its consolidated accounts of \$174,000.

The parent company's latest balance sheet shows a moderate increase in investments at £4,400,000, against £4,000,000, but the item for subsidiaries has jumped from £5,800,000 to £9,800,000 which in turn may be attributable to increased investment in uranium in Canada and, to a lesser extent, in Australia. It should be added that while the report carries consolidated accounts of the subsidiaries, these do not for exceptional reasons include the important Rio Tinto of Canada whose own separate consolidated accounts, however, accompany the Tinto

It is clear from the extended review of operations accompanying the Tinto of London report, that even if earnings for the time being will remain dependent on income accruing from older investments, the future potential is becoming impressive. During the past year, there have been modifications in the structure of the whole group. These have been aimed at some degree of decentralization while maintaining a common interest and interdependence among the various companies within the group.

Rio Canada has now been established as a public company, although the equity held by Rio London has been increased to just over 50 per cent. In Northern Rhodesia, the group's exploration programme has been transferred to a

	Price	+ or -		Price	+ or -		Price	+ or -		Price	+ or -
	Apr. 16	on week		Apr. 16	on week		Apr. 16	on week		Apr. 16	on week
Finance			Rand Gold contd.			Diamonds and Platinum			Tin (Nigerian and Miscellaneous) contd.		
African & European	53/11		W. Rand Consolidated	29/44		Anglo American Inv.	8 1/2	- 1/8	Gold & Base Metal	1/3	
Anglo American Corp.	6 1/2	- 1/8	Western Reefs	27/10 1/2	- 3d	Cass.	27/7 1/2	- 1/8	Jantar Nigeria	3/9	
Anglo-French	22/3	+ 9d				Cons. Diam. Prof.	10/7 1/2	- 3d	Jos Tin Area	15/-	
Anglo-Transvaal Corp.	26/3					S. W. A.			Kaduna Prospectors	2/11	
Central Mining (£1 shrs)	63/9	+ 2/3	O.F.S. Gold			De Beers Deif. Regd.	4 1/2	- 1/8	Krduna Syndicate	2/11	
Consolidated G's fields	58/3	- 3d	Freddies	4/9		De Beers Prof. Regd.	13 1/2		London Tin	2/11	- 1 1/2d
Consol. Mines Selection	28/3	+ 3d	Freddie's Consolidated	2/9	+ 1 1/2d	Pots. Platinum	15/6	+ 7 1/2d	United Tin	1/-	+ 1 1/2d
Enstol Consols.	1/44		F.S. Geduld	62/6	+ 7 1/2d	Water val	26/-	+ 1/6			
General Mining	58/1 1/2	- 2/6	Geoffries	20/3	+ 6d	Copper			Silver, Lead, Zinc		
H. E. Prop.	8/1 1/2	+ 1 1/2d	Harmony	20/3	+ 6d	Bancroft	39/7 1/2	- 1/-	Broken Hill South	76/3	- 1/3
Johnnies	39/6	- 3d	Loraine	3/10 1/2		Chartered	74/-	- 6d	Burma Mines	3/7 1/2	+ 1 1/2d
Rand Mines	66/3	+ 2/6	Lydenburg Estates	11/3		Esperanza	2/6	+ 3d	Consol. Zinc	85/-	+ 3/6
Rand Selection	34 1/4	- 7 1/2d	Meiriespruit	3/9		Magundi	9/-		Lake George	10/3	- 3d
Rand Corporation	35/9	- 7 1/2d	Middle Wits	48/-	+ 6d	Messina	8 1/2	- 1/8	Mount Isa	25/3	- 1/-
Vereeniging Estates	5 1/2		Ofats	48/3	+ 1 1/2d	Rhanga	12 1/2	- 1/8	New Broken Hill	59/3	- 2/9
Wits	36/-	- 9d	President Brand	27/9	+ 3d	Rhod. Anglo-American	37/3	+ 9d	North Broken Hill	6 1/2	+ 1/2
West Wits	31/9		President Steyn	10/-	+ 3d	Rhod. Katanga	22/7 1/2	- 1 1/2d	Rhodesian Broken Hill	11/9	- 3d
			Virginia Ord.	13/3	+ 6d	Rhodesian Selection	39 1/2	- 1/2	San Francisco Mines	27/3	- 1/9
Rand Gold			Welkom	63/1 1/2	+ 1/3	Rhokana	4 1/2	- 1/8	Uruwira	3/6	- 3d
Blyvoors	19/6	+ 6d	Western Holdings			Rio Tinto	13/-	- 1/8	Miscellaneous		
Brakpan	5/1 1/2	- 1 1/2d	West African Gold			Roan Antelope	4 1/2	- 1/8	Base Metals and Coal		
Buffelsfontein	31/3	+ 6d	Amalgamated Bank	1/2 1/2	- 1d	Selection Trust	7 1/2	- 1/8			
City Deep	12/4 1/2	- 1 1/2d	Ariston	4/4 1/2	- 6d	Tanks	4 1/2	- 1/8	Amal. Collieries of S.A.	2 1/2	+ 1/2
Consol. Main Reef	12/4 1/2	+ 3d	Asanti	18/-		Thariss Sulphur Br.			Associated Manganese	38/3	
Crown	20/-	- 3d	Bibiani	2/4 1/2		Tin (Eastern)			Cape Asbestos	11/3	- 1 1/2d
Dagdas	17/6	+ 3d	Bremang	1/4 1/2		Ayer Hitam	26/9	- 3d	C.P. Manganese	28/3	- 6d
Dominion Reefs	20/6	+ 3d	Ghana M.R.	1/4 1/2		Copeng	16/1 1/2	- 3d	Consol. Murchison	50/-	+ 1/3
Durban Deep	21/3	+ 3d	Komongo	1/4 1/2		Hongkong	7/7 1/2	+ 3d	Central Navigation	3 1/2	
E. Champs	2/9	+ 1 1/2d	Marlu	1d.		Ipo	17/9		Turner & Newall	132/6	+ 4/3
E. Dagdas	7/10 1/2		Taguach	1/-		Kamunting	11/10 1/2	+ 10 1/2d	Wankie	18/9	
E. Geduld (4s. units)	26/9		Western Selection	5/6	- 1 1/2d	Kepong Dredging	5/6		Witbank Colliery	5 1/2	
E. Rand Props.	68/9	+ 9d	Australian Gold			Kinta Tin Mines	26/3	+ 1/-	Canadian Mines		
Geduld	3/10 1/2	- 4 1/2d	Gold Mines of Kalgoorlie	12/9	- 3d	Malayan Dredging	16/4 1/2	+ 9d	Dome	\$25 1/2	- 1/2
Gert. Areas	16/3	+ 4 1/2d	Great Boulder Prop.	12/9	- 3d	Pahang	15/1 1/2	- 3d	Hollinger	\$56	+ 1 1/2
Grootvlei	3/10 1/2	+ 4 1/2d	Lie View & Star	19/1 1/2	- 6d	Pengkalen	18/9	- 3d	Judson Bay Mines	\$12 1/2	+ 1 1/2
Harlebeestfontein	47/4 1/2	+ 9d	Mount Morgan	14/3	- 6d	Rambuts	20/-	- 1 1/2d	International Nickel	\$212 1/2	+ 1 1/2
Libanon	6/11										

newly-formed subsidiary, Rio Tinto (Northern Rhodesia) and there has been a similar arrangement in Southern Rhodesia, the capital of these new subsidiaries being mainly held by other subsidiaries.

This pattern of the group's structure, which has been emerging during the past two or three years is not without interest in the light of the recent U.K. budget concessions commented on here last week. Rio Tinto itself is certainly a U.K.-controlled undertaking and it certainly operates abroad; but in terms of the budget concessions for overseas trading corporations it may well be true that Tinto, through its network of subsidiaries, would already be enjoying such benefits in the course of time. To the big question whether the Chancellor's budget will make much difference to Tinto, the answer seems—not very much.

This year will be an important one in the group's Canadian activities, since it will see the bringing to production of the several uranium propositions in which substantial interests are held. For the longer-term future, much importance could attach to the chances of Oceanic Iron Ore of Canada which is testing iron ore deposits in the Ungava Bay area. In Southern Rhodesia, the Empress Nickel claims have been purchased for £250,000 and in the Transvaal the Palabora copper deposit is to be explored in conjunction with Newmont Mining of the U.S.

It is also believed that Tinto, through a subsidiary, intends to exercise an option it holds on 3,000,000 shares in Devon Palmer, a new Canadian oil operation, at \$1.40 per share, the total cost thus being

\$4,200,000. Apart from Devon Palmer's oil potential, natural gas and sulphur may also play a prominent part in this new company's fortunes. Tinto indeed, has many fingers in many pies.

POINTS FROM THE RAND QUARTERLIES

With Easter looming up, there has been a sudden spate of March quarterly reports from the South African gold mines. These will be summarized in detail in our usual supplement. Meanwhile, it is worth drawing brief attention to some of the more outstanding features of the statements.

In the Anglo American Corporation group of companies, special mention needs to be made about the development position at Western Holdings where, during the past three months, Basal reef development, amounting to 19,300 ft., gave payability of 91 per cent for an in.-dwt. figure of 1,331, against 92 per cent and 1,045 respectively. Holdings' development has been pretty consistent at around the 1,000 in.-dwt. mark for some time and this considerable recent improvement represents, in fact, the best reef values yet to be obtaining in sampling.

At the neighbouring Free State Geduld, overall values and payability were substantially unchanged at 1,484 in.-dwt. and 99 per cent respectively, but these figures cloak the fact that at No. 1 shaft, hitherto the lower grade area of the mine, the in.-dwt. were as good as 1,137.

West Driefontein shares have been a

persistently weak market for some time past, but there is little in the latest quarterly of this Gold Fields' group Far West Rand producer to account for the decline. It is true that while payability has been maintained at 100 per cent, values have declined to 752 in.-dwt. against the 859 recorded in the December quarter. But this is far from being a serious or catastrophic fall. Working profits during the past three months were £1,813,000, against £1,758,000 in the previous quarter, but higher taxation brings the net profit back to £1,066,000, against £1,105,000. A decline of this order is not likely to be significant in terms of dividends. The sister company, Doornfontein, continues to do well, in.-dwt. being 555 against 624 in the final quarter of last year. Both figures are well above the average previously seen.

It is disclosed in the Harmony statement that there has been a sudden and large increase in the water inflow. It would appear, however, that the pumps have the matter well in hand. Some 3,500,000 gals. daily have recently been pumped to the surface as against the present pumping capacity of 7,000,000 gals. daily which is, in turn, likely to be increased to 9,000,000 gals. by September. It is planned to further increase capacity when the No. 2 shaft is commissioned.

It is evident, notably from the water position at the nearby Merriespruit mine, that underground water difficulties in the Virginia area of the O.F.S. are for the moment bigger than had been anticipated. Suggestions have been heard that Merriespruit, still submerged to within about 1,860 ft. of the shaft top, together with

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Virginia, Harmony and the New Free State Saaiplaas, might be considered a joint pumping arrangement for the whole of the four mines.

Merriespruit is now proposing a two-stage programme for bringing the mine back to a state of viability. It is proposed first to dewater the mine and accomplish some development and then resume development on a scale sufficient to bring production back to its normal level. The first stage will be accomplished by advancing Virginia's 28 level haulage into Merriespruit ground to a position adjoining the No. 1 shaft. Merriespruit will then be dewatered by pumping to the surface through the Virginia system. This is going to be an expensive business, for the first stage alone is estimated to cost £1,200,000.

SIAMESE TIN AND THE BUDGET

Commenting on the U.K. budget proposals last week it was suggested here that Samese Tin might be among one of the chief beneficiaries from the overseas trading concessions. This view was based on an analysis of the last accounts which suggested that the company paid no local tax on its operations in the Far East. In fact, it is now understood that there is a 20 per cent impost in Siam. Payment of this is set off against U.K. tax under unilateral tax arrangements but the figure is not disclosed in the accounts. There may be accounting reasons why this is not possible, though these are not immediately obvious. The company will, of course, benefit substantially from the new U.K. proposals, but not apparently to the extent at first thought likely.

RECENT INTERIM DIVIDEND ANNOUNCEMENTS

Company	Year ending	Dividends latest	Dividends corresponding	Date Payable	Total last year
			%		%
Tanganyika Concessions	31. 7.57	30(a)	15	90
Pahang Cons.	31. 7.57	10	10	50
Messina (Transvaal) Dev.	30. 9.57	130	170	420
Lake View	30. 6.57	18½	18½	50
Globe & Phoenix	31.12.57	30	30	—

(a) Raised to reduced disparity between interim and final.

Coming Events

The annual dinner of the Camborne School of Mines will be held on May 10, 1957.

*

A meeting of the South Wales Institute of Engineers will be held at the Institute, Cardiff, on May 16, 1957.

*

The centenary celebrations of the Midland Institute of Mining Engineers will be held in Sheffield from May 14 to 16, 1957.

*

The 79th annual general meeting of the Mining Institute of Scotland will be held at the Grosvenor Restaurant, Glasgow, on May 25, 1957.

*

A meeting of the South Staffordshire and Warwickshire Institute of Mining Engineers will be held at Cannock Mining College on May 16, 1957.

*

The 1957 American Mining Congress will be held in Salt Lake City, Utah, during September 9-12.

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AMALGAMATED COLLIERIES OF SOUTH AFRICA LIMITED

(Incorporated in the Union of South Africa)

INCREASED INCOME FROM COLLIERIES

The following extracts are from the Statement by the Chairman, Mr. T. Coulter, which has been circulated with the report and accounts:—

The company's own operating collieries are Cornelia, near Vereeniging, and Schoongezicht in the Middleburg district and it holds virtually the entire issued share capital of Springfield Collieries, Limited, which company carries out mining operations near Balfour in the Transvaal. Its other subsidiary, Largo Colliery Company Limited, ceased mining operations in November, 1953, and is in the process of being liquidated.

The company also has considerable interests in New Largo Colliery Limited and Blesbok Colliery Limited, both producing collieries, and in Witbank Coal Holdings Limited, a company formed some years ago as a holding company to lease coalbearing properties acquired in the Witbank district.

Accounts

The following is a summary of the salient points in the profit and loss and appropriation accounts:—

	1956 £	1955 £
Net profit	892,480	765,727
Less Provision for taxation	151,052	115,702
Profit after taxation	741,428	650,025
Add Unappropriated profits brought forward	467,671	344,918
Non-recurrent credit	—	21
	1,209,099	994,964
Less Writings off	13,347	5,313
	1,195,752	989,651
Less Net silicosis liability to December 31, 1953	—	21,480
	1,195,752	968,171
Less Appropriated for capital expenditure	274,484	—
	921,268	968,171
Less Dividends 1956—4s. (1955—3s. 6d.)	622,000	500,500
Unappropriated profits	£299,268	£467,671

Income from the company's directly operated collieries and from dividends increased satisfactory due mainly to higher prices for coal received during 1956. On the other hand, expenses were considerably reduced as negligible interest charges were involved following the repayment of the company's loan indebtedness at the beginning of the year.

Current assets of £1,029,615 exceed current liabilities and provisions by £295,399. Current assets, however, included stores to the value of £177,231 so that the liquid surplus was £118,168.

The 250,000 reserve shares issued at 45s. per share were allotted in January 1956 and raised the issued capital to £3,110,000 in shares of £1 each. The share premium account now stands at £1,767,500.

Cornelia Colliery: The greater part of the output of this colliery is delivered to the Electricity Supply Commission for burning in the Vereeniging and Vaal Power Stations, and the balance finds a ready market for industrial and domestic purposes. The sales output in 1956 was 3,474,815 tons and the mining profit £447,561 as against 3,688,718 tons and £415,864 in 1955.

The reduction in coal sales output of 213,903 tons was occasioned by the temporary removal from service of three faulty generating sets at the pithead Vaal Power Station of the Electricity Supply Commission. The sales to Escom were approximately 351,000 tons less than in 1955 but part of this shortfall was made up by supplying 100,496 tons to the Rand Water Board and 75,881 tons to the Klip Power Station. The difficulties at the Vaal Power Station have now been rectified.

Rise in Overall Profit

In spite of a drop in output of almost 6% the overall profit rose by 7.6% brought about by two factors. First, the increase in the controlled price of coal granted in November 1955 and, secondly, coal supplied to the Rand Water Board and other customers was sold at this controlled price which is higher than that which would otherwise have been received for coal supplied by the colliery to Escom under long term contract.

Schoongezicht Colliery: This colliery produces a good quality coal suitable for

industrial and railway requirements.

On October 8, 1956, an explosion of firedamp occurred in a development drive resulting in the death of one European and eleven Natives. A considerable degree of disorganization followed the explosion and output has been severely restricted pending the completion of a new 16 feet diameter upcast shaft which is being sunk to provide additional ventilation. It is expected that this shaft together with a new large capacity ventilating fan will be ready for commissioning towards the end of April when output will return to normal.

The sales output in 1956 was 824,575 tons and the mining profit £156,967 as against 872,041 tons and £125,001 in 1955. The price increase granted in November 1955 more than offset the loss of revenue occasioned by the lower sales output.

The sales output for 1956 was 2,097,338 tons and the net profit after taxation £221,135 as against 2,321,125 tons and £176,415 in 1955. A considerable part of the increase in profit is attributable to the revision in the profit formula with effect from February 1, 1956, in terms of which coal is supplied to the Electricity Supply Commission.

KONONGO GOLD MINES, LTD.

The twenty-third annual general meeting of Konongo Gold Mines, Ltd., was held on April 16, in London. Mr. Robert Annan, M.I.M.M., Chairman, presided, and in the course of his speech said:—

After providing for depreciation and taxes, etc. and bringing in the unappropriated balance from the previous year, there was an available balance of £129,961. Out of this your Directors recommend a dividend of 3d. per share. With tax at 8s. 6d. this will cost £50,343 and reduce the carry-forward by £4,839 to £79,618.

In the Balance Sheet the issued capital now stands at £350,209. This is the result after paying off £309,629 of the previous issued capital in cash and of issuing shares of par value of £40,580 as part purchase price of the Lyndhurst undertaking.

Net current assets, after providing for the dividend and for taxation payable in the future, stood at £54,954. This is a decrease of £304,221 from the previous year's figure due almost entirely to the repayment of capital, the other items being in balance overall.

For the six months of the current financial year ended March 31, the mill has treated 28,860 tons recovering 23,683 ounces of gold for a working profit before depreciation and tax of £99,086.

Development

Development during the year was also curtailed by the strike. Out of a total of 3,046 feet, 570 feet were on reef, of which 245 feet, or 43 per cent, were payable. The chief feature was the extension of No. 10 South Level Boabedroo for a further 110 feet in ore, bringing the total payable length in this area to 490 feet averaging 17.4 dwt. over 69 inches. This lies to the south of the main Boabedroo ore-body which we have been working in the past.

Development on the 15th and 16th Levels Boabedroo gave no payable exposures during the year but had not reached a conclusive stage.

Current Year's Activities

During the current year development has continued in the Boabedroo Section both in depth and on the new ore-body disclosed in the 10th Level South. In the main Boabedroo ore-shoot the 13th Level North Drive has proved an extension of 295 feet averaging 19.3 dwt. over 47 inches.

On the 15th Level 145 feet averaging 16.7 dwt. over 46 inches has been exposed in the South Stope Drive and 40 feet averaging 10.7 dwt. over 60 inches at the end of the North Drive. On the 16th Level 85 feet averaging 18 dwt. over 44 inches has been exposed at the end of the South Drive. Further exploration is needed to follow up these exposures and assess their significance.

The new ore-shoot on 10th Level South has now been entered on both the 8th and 9th Levels. Up to the end of March, No. 8 Level had exposed 70 feet assaying 27.1 dwt. over 42 inches and No. 9 310 feet assaying 12.2 dwt. over 58 inches, with the possibility of further extensions on both levels. The downward extension remains to be traced but these developments should add about 50,000 tons to reserves.

